

428XL SPECIFICATIONS

CENTRAL UNIT

CENTRAL UNIT ARCHITECTURE

Client-server architecture: clients can be located anywhere and access server through the web. Server is connected to line interface LCI-428.

SERVER

Workstation:	Sun or PC desktop or laptop, depending on configuration, no screen required
Solaris	Blade 2500 or Ultra 45 mono-processor dual disk 4 GB for impulsive operations and vibroseis up to 4,000 channels @ 2 ms Blade 2500 or Ultra 45 bi-processor dual disk 8 GB for vibroseis operation above 4,000 channels @ 2 ms
Linux	IBM Zpro 9228 mono-processor 3 disk 4 GB for impulsive operations and vibroseis up to 4,000 channels @ 2 ms IBM Zpro 9228 bi-processor 3 disk 8 GB for vibroseis operation above 4,000 channels @ 2 ms. Dell Latitude D520 2GB for impulsive operations up to 1,000 channels @ 2 ms (428Lite).
Operating system:	Solaris 8 or 10, Linux Red Hat WS4
Software:	e-428 Server Software, performing data computation, storage and handling of local or remote clients

CLIENT

Station:	PC desktop or laptop, local or remote
Screens:	Up to 3 per client
Operating system:	Windows 2000, XP, Linux
Software:	e-428 Client software, performing operator interface and parameters display. It can be ran on the server machine for small configurations (i.e. 2,000 channels @ 2 ms on a IBM Zpro 9228 mono-processor).

LCI-428

Field units management, up to 10,000 channels real time @ 2 ms.

Up to 10 LCI-428 can be linked together to handle up to 100,000 channels real time @ 2 ms.

Operating voltage:	110-220 VAC, 50/60 Hz
Power consumption:	6.7 W
Operating temperature:	0 to +45°C
Storage temperature:	-40° to +70°C
Dimensions (HxWxD):	2U 19" rackable, 86.1 x 483 x 420.7 mm (19 x 16.5 x 3.4 in.)
Weight:	4.1 kg (9.0 lbs.)

PERFORMANCES

Performances are easily scalable, depending on server workstation configuration.

PROCESSING CAPABILITIES

- Correlation before or after stack
- Vertical or diversity stack
- Spike editing: zeroing or clipping
- Alternate or simultaneous multi-source operation
- Slip sweep
- HFVS

TRANSMISSION CAPABILITIES

Line data rate:	8 Mbps, compatible with 408UL equipment 16 Mbps, 428XL equipment only
Transverse data rate:	TCP-IP protocol, 100 Mbps Ethernet-based transmission

HARDWARE CAPABILITIES

SEG-D files are stored temporarily in the server disk prior to be transferred to tape or NAS or QC tools, allowing acquisition to continue during taping incident (tape recording fault tolerant), and allowing SEG-D to be annotated with source and receiver QCs.

Maximum record length:

Depending on server memory	8 GB allows 10,000 channels 4 fleets vibroseis, 22 s acq. length @ 2 ms
Real-time links:	eSQC Pro for data QC SGA for specific trace analysis
Play-back:	eSQC Pro Plotter

STORAGE CAPABILITIES

Tape drives:	Listed in compatibility list
NAS	



Ahead of the CurveSM

GROUND EQUIPMENT

FDU-428

Functions:	<ul style="list-style-type: none">● Data transmission with CRC control● 24 bits A/D conversion● D/A conversion with programmable bit stream
Input impedance:	
Differential mode	20 k Ω // 77 nF
Common mode	105 k Ω
Full scale input levels	
@ G1600	1.6 V RMS
@ G400	400 mV RMS
Offset:	0 (digitally zeroed)
Crosstalk:	> 130 dB
Low-cut filter:	None
High-cut filter:	0.8 FN (linear or minimum phase)
Stop band attenuation:	> 120 dB (above Nyquist)
Sample rates:	4, 2, 1, 0.5, 0.25 ms
Word size:	24 bits
Time standard:	True synchronous system
Interval between FDUs:	@ 8 Mbps: up to 110 m with ST+ cable, 90 m with WPSR cable @ 16 Mbps: up to 90 m with ST+ cable, 75 m with WPSR cable

Power consumption:	120 mW @ 8 Mbps, 132 mW @ 16 Mbps
Noise (3-200Hz) :	
@ G1600	450 nV RMS
@ G400	145 nV RMS
Instant dynamic range:	130 dB
System dynamic range:	140 dB
Distortion:	-110 dB
Gain accuracy:	< 0.1%
Phase accuracy:	20 μ s
CMRR:	110 dB
Operating power voltage	22 to 50V DC
Dimensions (HxWxD):	82.5 x 71.4 x 194 mm (3.2 x 2.8 x 7.6 in.)
Weight:	0.35 kg (0.77 lbs.) with ST+ cable
Operating temperatures:	-40° to +70°C
Storage temperatures:	-40° to +70°C
Water depth:	15 m (for WPSR) 1 m (for ST+)

DSU3-428

Functions:	<ul style="list-style-type: none"> ● Acceleration measurement and data transmission with CRC control ● 24 bits digital acquisition
Full scale:	5 m/s ²
Tilt max value:	+/- 180°
Noise (10-200Hz):	0.4 $\mu\text{m/s}^2/\sqrt{\text{Hz}}$
System dynamic range:	120 dB @ 4 ms
Sampling rate:	4, 2, 1, 0.5, 0.25 ms
Bandwidth:	0 - 800 Hz (up to 1600 Hz with degraded specifications)
Distortion:	-90 dB
Amplitude calibration accuracy:	± 0.25%
Orthogonality calibration accuracy:	± 0.25°
Power consumption:	285 mW @ 8 Mbps, 300 mW @ 16 Mbps
Static sensor tests:	Tilt, gravity, noise
Dynamic sensor tests:	Distortion, gain, phase
Dimensions (HxWxD):	159.2 x 70 x 194 mm (6.2 x 2.7 x 7.6 in.)
Weight:	0.43 kg (0.9 lbs.)
Operating temperatures:	-40° to +70 °C
Storage temperatures:	-40° to +70 °C
Water depth:	15 m (for WPSR) 1 m (for ST+)

LAUL-428

Functions:	<ul style="list-style-type: none"> ● FDUs, DSUs and line management, data transmission with error recovery and temporary storage ● 50 V line power supply ● Tests 																																																						
Tests capabilities	<ul style="list-style-type: none"> ● Power supply ● Data transmission ● Field tests (resistance, tilt, leakage, noise, CMRR) ● Instrument tests (noise, distortion, phase, gain, CMRR, crosstalk) 																																																						
Operating power voltage:	10.5 to 15 VDC, 2 battery connectors, to allow uninterrupted operation during battery replacement																																																						
Power consumption:	2.8 W (idle: 320 mW)																																																						
Maximum number of FDUs/DSUs between LAUs (@ 2 ms):																																																							
Cable length between FDUs/DSUs	<table> <thead> <tr> <th></th> <th>8 Mbps</th> <th>16 Mbps</th> </tr> </thead> <tbody> <tr><td>5 m</td><td>60/20</td><td>102/40</td></tr> <tr><td>10 m</td><td>60/20</td><td>90/40</td></tr> <tr><td>15 m</td><td>60/20</td><td>81/40</td></tr> <tr><td>20 m</td><td>60/20</td><td>74/40</td></tr> <tr><td>25 m</td><td>60/20</td><td>68/40</td></tr> <tr><td>30 m</td><td>60/20</td><td>64/40</td></tr> <tr><td>35 m</td><td>60/20</td><td>60/40</td></tr> <tr><td>40 m</td><td>59/20</td><td>57/40</td></tr> <tr><td>45 m</td><td>56/20</td><td>55/39</td></tr> <tr><td>50 m</td><td>54/20</td><td>52/37</td></tr> <tr><td>55 m</td><td>52/20</td><td>50/36</td></tr> <tr><td>60 m</td><td>50/20</td><td>48/34</td></tr> <tr><td>70 m</td><td>47/20</td><td>45/32</td></tr> <tr><td>80 m</td><td>44/20</td><td>43/30</td></tr> <tr><td>90 m</td><td>42/20</td><td>40/29</td></tr> <tr><td>100 m</td><td>38/20</td><td>NA/NA</td></tr> <tr><td>110 m</td><td>37/20</td><td>NA/NA</td></tr> </tbody> </table>		8 Mbps	16 Mbps	5 m	60/20	102/40	10 m	60/20	90/40	15 m	60/20	81/40	20 m	60/20	74/40	25 m	60/20	68/40	30 m	60/20	64/40	35 m	60/20	60/40	40 m	59/20	57/40	45 m	56/20	55/39	50 m	54/20	52/37	55 m	52/20	50/36	60 m	50/20	48/34	70 m	47/20	45/32	80 m	44/20	43/30	90 m	42/20	40/29	100 m	38/20	NA/NA	110 m	37/20	NA/NA
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Line data rate:	1000 ch. @ 2 ms @ 8 Mbps, 2000 @ 16 Mbps																																																						
Memory:	30 MB local buffer for non-real time mode transmission																																																						
Material:	Aluminium																																																						
Dimensions (HxWxD):	108 x 93 x 224 mm (4.2 x 3.6 x 8.8 in.)																																																						
Weight:	2.4 kg (5.3 lbs.)																																																						
Operating temperatures:	-40° to +70 °C																																																						
Storage temperatures:	-40° to +70 °C																																																						
Water depth:	15 m																																																						

LAUX-428

Functions:	<ul style="list-style-type: none">● Ethernet-TCP/IP data transmission and routing (transverse) with error recovery and temporary storage● 50 V line power supply● Tests
Tests capabilities:	<ul style="list-style-type: none">● Power supply● Data transmission● Field tests (resistance, tilt, leakage, noise, CMRR)● Instrument tests (noise, distortion, phase, gain, CMRR, crosstalk)
Operating power voltage:	10.5 to 15 VDC, 2 battery connectors to allow uninterrupted operation during battery replacement
Power consumption:	
LAUX-428	6.7 W (idle 1 W)
TREP-428	1.3 W
TFOI-428	1.1 W
Interval between LAUX on transverse:	
Copper wire	up to 6 x 125 m with TREP-428 repeaters and SRHRF cable
Fiber optics	up to 10 km (one piece fiber) with TFOI-428 interfaces
TREP-428 and TFOI-428 are powered through the line by LAUX-428	
Transverse data rate:	10,000 ch. @ 2 ms
Memory:	3 MB local buffer for non-real time mode transmission
Material:	Aluminium
Water depth:	15 m (also for TREP-428 and TFOI-428)
Operating temperature:	-40° to +70 °C
Storage temperature:	-40° to +70 °C
Dimensions (HxWxD):	137 x 312 x 242 mm (5.4 x 12.3 x 9.5 in.)
Weight:	5.5 kg (12.1 lbs.)

LAUR-428

Functions:	<ul style="list-style-type: none">● Handles 408UL or 428XL links of FDUs or DSUs● Up to 30 channels each side of LAUR-428● Slave of a cell handled by master LRU
Tests capabilities:	<ul style="list-style-type: none">● Power supply● Data transmission● Field tests (resistance, tilt, leakage, noise, CMRR)● Instrument tests (noise, distortion, phase, gain, CMRR, crosstalk)
RF transmission:	<ul style="list-style-type: none">● 30 channels @ 2 ms real-time radio transmission● Bandwidth occupancy 200 kHz● Data rate 256 kbps● Up to 6 W automatically adjusted output power<ul style="list-style-type: none">- 215-250 MHz international use- 217-218 MHz & 219-220 MHz USA use- 217-220 MHz Canada use
FCC emission designators:	200 KD1D
Operating power voltage:	10.5 to 15 V DC, 2 battery connectors to allow uninterrupted operation during battery replacement
Power consumption:	
When retrieving	40.6 W with 30 FDUs connected
Sleep mode	2.4 W with receive ON 0.2 W without receiving
Memory:	3 MB local buffer for non-real time mode transmission
Material:	Aluminium
Water depth:	1 m
Operating temperature:	-40° to +70 °C
Storage temperature:	-40° to +70 °C
Dimensions (HxWxD):	169.5 x 380 x 380 mm (6.7 x 15 x 15 in.) without antenna
Weight:	12.2 kg (26.8 lbs.)

LRU

Radio functions:	<p>1 - Communication with another LRU for data transmission with error recovery and temporary storage</p> <ul style="list-style-type: none">● Up to 16 km up to 240 channels* @ 2 ms real-time with Yagi type antenna (8 m mast)● Up to 24 km up to 60 channels* @ 2 ms real-time with Yagi type antenna (8 m mast) <p>2 - Master of a cell composed of several LAURs for data transmission with error recovery and temporary storage</p> <ul style="list-style-type: none">● Up to 24 km with Yagi type antenna (18 m mast)● Up to 8 km with omni-directional antenna (8 m mast)
Cable functions:	Full LAUX capabilities
Tests capabilities:	<ul style="list-style-type: none">● Power supply● Radio data transmission● Cable data transmission● Field tests (resistance, tilt, leakage, noise, CMRR)● Instrument tests (noise, distortion, phase, gain, CMRR, crosstalk)
Antenna spectrum monitoring capability	
Radio setup:	Pocket terminal connection capability
Memory:	3 MB local buffer for non-real time transmission mode
Interval between LRUs or LRU and LAUX on transverse:	<ul style="list-style-type: none">● Up to 300 m with ST+ cable● Up to 250 m with WPSR● Up to 400 m with WPSRLR
Material:	Aluminium
Dimensions (HxWxD):	225 x 380 x 380 mm (8.8 x 14.9 x 14.9 in.)
Weight:	12.6 kg (27.8 lbs.)
Operating power voltage:	10.5 to 15 VDC, 2 battery connectors, to allow uninterrupted operation during battery replacement

Power consumption:	
Master	23 W
Slave	80 W when retrieving
Sleep	1.2 W
Operating temperatures:	-40° to 70° C
Storage temperatures:	-40° to 70° C
Water depth:	1 m
RF Frequencies:	<ul style="list-style-type: none">● 215-250 MHz international use● 217-218 MHz & 219-200 MHz USA use● 217-220 MHz Canada use
RF Output power:	RF power management; 6 W nominal
RF Output impedance:	50 Ω
FCC emission designators:	200 KD1D and 800 KD1D
Cable performances:	
	(Typical @ 2 ms sample rate and 25° C)
	Maximum number of FDUs per LRU :
	<ul style="list-style-type: none">● 120 with up to 30 m interval● 96 with up to 55 m interval● 80 with up to 75 m interval
	Maximum number of FDUs between LRUs or between LRU and LAU :
	<ul style="list-style-type: none">● 60 with up to 30 m interval● 48 with up to 55 m interval● 40 with up to 75 m interval

* the number of channels increases proportionally with the ratio:
(shot time)/(acquisition time)

All specifications are typical at 25°C

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